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THE DUTCH ELM DISEASE ERADICATION PROJECT: FEDERAL, STATE, AND LOCAL COOPERATION

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INTRODUCTION

This circular is prepared expressly for the property owner who is interested in elms because of their real as well as aesthetic value and for the municipal and county shade-tree officials who are charged with the care of park and street elms. It contains a summary of the present situation, a brief statement of the objective and methods of governmental agencies, and suggestions for the active participation of the public in the Dutch elm disease eradication program.

THE DUTCH ELM DISEASE

DISTRIBUTION

The original home of the Dutch elm disease has not been determined. It was probably present in Belgium, France, Germany, and the Netherlands by 1920. At present practically the entire area in Europe south of Scotland, Denmark, and Prussia is included in the disease area. There is no report of a concerted effort to control the disease on the Continent.

The disease entered this country probably in elm burl logs imported from Europe. Diseased logs have entered at New York City, Baltimore, Norfolk, and New Orleans and have been shipped to or through Cleveland, Cincinnati, Dayton, Indianapolis, Chicago, Kansas City, Louisville, Knoxville, and other cities. Many of the logs that were intercepted were invaded by bark beetles as well as the fungus which causes the disease.

The disease has gained a strong foothold around the port of New York City, where over 7,600 infected trees have been found within 50 miles of this port. Infected trees have been found in six other areas, and in the numbers given, as follows: Cleveland, Ohio, 10; Cincinnati, Ohio, 1; Baltimore, Md., 1; Indianapolis, Ind., 4; Old Lyme, Conn., 1; and Norfolk, Va., 1. In the major disease area and in outlying areas there probably are infected trees that have not been located.

CAUSE AND SYMPTOMS

Graphium ulmi (*Ceratostomella ulmi* (Schwarz) Buisman), the fungus that causes the Dutch elm disease, is known to be parasitic only on elm and the closely related Japanese zelkova. When introduced into the sapwood it causes the formation of gums and resins in the water-conducting vessels, and when the water flow is critically reduced or stopped the tree may die. After the death of a diseased

tree or the transfer of the fungus to dead and dying material, *Graphium ulmi* may grow in insect tunnels and in cracks developed in the wood and bark.

The most conspicuous external symptom of the Dutch elm disease is the wilting, and sometimes yellowing and dropping, of the leaves of the infected branch or entire tree. The gums and resins appear as a brown discoloration in the form of dots or a ring in one or more recent annual rings. Usually short brown streaks in the cambial region can be seen when the bark is peeled.

Other elm wilt diseases, such as *Verticillium* wilt and *Cephalosporium* die-back, may produce somewhat similar symptoms. The only known method of distinguishing between the Dutch elm disease and these diseases is by laboratory tests. When small chips from specimens of diseased trees are placed in a culture plate, the fungus grows readily and within about 4 days can be identified. Several specimens cut from recently dead or dying parts of the tree are required for these tests.

INSECT CARRIERS

The economic importance of many elm insects has only recently been accentuated because of the possibility that they are carriers of the Dutch elm disease. Many of these insects, therefore, have not been carefully studied to determine their range, prevalence, and habits. Some of the engraver bark beetles that feed on healthy elms have been found to be disease carriers. If the adults emerge from a diseased tree, they may carry the Dutch elm disease fungus and introduce it into a healthy tree as they feed in the twig crotches. However, since the carrier-fungus relationship is apparently physical and not biological, all insects and other agencies associated with elms may be important factors in the spread of the disease.

The larger European elm bark beetle, *Scolytus scolytus* (Fab.), the most important carrier in Europe, is not known to be established in the United States, although it has been intercepted in European elm burl logs. The smaller elm bark beetle, *S. multistriatus* Marsh., considered a carrier in this country, is established in New England, southeastern New York, New Jersey, and eastern Pennsylvania. There is evidence to indicate that this area includes at least two infestations of this beetle, one reported near Boston in 1909 and another perhaps older one at New York City. Preliminary scouting indicates that there may be a scolytus-free area between these two infestations. *Hylurgopinus rufipes* (Eichh.), the American bark beetle with habits similar to those of *Scolytus*, has been collected throughout most of the northern range of the American elm.

ERADICATION PROGRAM

OBJECTIVE

The immediate control and ultimate eradication of the Dutch elm disease in the United States is the primary objective of the governmental agencies engaged in the work. To accomplish this objective, the early location and prompt destruction of all material infected with *Graphium ulmi* is deemed essential. The final cost of the project and the number of elms that are killed before the disease is eradicated will depend largely on the timeliness and the degree of thoroughness of the work each year.

SCOUTING

Systematic scouting of an area several times each summer over a period of years appears to be the most practical way of locating all the diseased elms in that area. The period from May 15 to August 15 is the most satisfactory time for scouting, June and the early part of July being the most desirable part of this period. Scouts assigned to a definite area are required to examine each elm systematically for symptoms of the Dutch elm disease. Small branches are cut from all elms that show wilting, yellowing, or dropping of the leaves. If the typical sapwood discoloration is present, the scouts collect suitable specimens for the laboratory diagnosis. A "Graphium suspect card", giving the location and general condition of the tree, is made out for each set of specimens.

ERADICATION

A list of all trees that are found by the laboratory to have the Dutch elm disease is submitted to the proper State official. He then makes arrangements with the owner for the removal of each tree. In many instances, local governments or property owners have removed the diseased trees on their property. Otherwise, the diseased trees are removed by the State and Federal organizations. Because the wood from these trees is infected with the fungus that causes the disease, all wood must be burned immediately to destroy the fungus and insects which may be present.

SANITATION WORK

It is recognized that cut and fallen elm wood as well as elms that have died from other causes may support *Graphium ulmi* and many possible insect carriers. Moreover, the fungus may be present in sickly elms and produce a chronic form of the disease. In such cases the Dutch elm disease symptoms may be masked by the general sickly condition of the trees. In order to reduce this source of the fungus, a concerted effort is being made to destroy all such elm wood and trees in the major disease area and in a small zone around it. The removal of dying elms, in this phase of the program, is limited to those that have declined to a point when they are no longer of real value.

COOPERATION OF THE PUBLIC

There are at least four important phases of the Dutch elm disease eradication program in which the general public may materially assist the governmental agencies.

LOCATION OF DISEASED ELMs

Plans are being made for systematic scouting of the area within 50 to 60 miles of New York City, the outlying areas where diseased trees have been found, and other areas exposed to imported diseased material. The total size of these areas is strikingly small when compared to the whole area in which the Dutch elm disease may possibly exist. Individuals in all parts of the area can assist by reporting or collecting suitable specimens from trees that show the symptoms of the disease. Within the work areas a requested inspection will be made by the scouts as they periodically scout the area in which the tree is located. For the sake of economy, it is suggested that six specimens about three-fourths inch thick and 6 inches long from trees outside the work areas be submitted directly to the main office

of the Dutch elm disease eradication project.¹ Upon request, a supply of Graphium suspect cards to send in with each set of specimens will be forwarded to interested persons. The timely location and proper diagnosis of all diseased elms in the United States is an important step in the eradication.

COLLECTION OF ELM INSECTS

The collection and correct identification of all insects commonly associated with elms will aid in planning the field work. Careful examination of dead and dying elms may reveal the presence of the large *Scolytus* bark beetle in this country. In the same manner the range of both the American and the small European bark beetles may be more definitely defined. Furthermore, the general observation of all elm insects and their habits may lead to the discovery of other insect carriers. The value of such a survey depends not only on the thoroughness and carefulness with which it is done in an area but also upon the number of areas that are surveyed.

SANITATION WORK

The sanitation work of the governmental agencies is confined largely to the removal of dead and dying elms. Local governments and property owners can cooperate by doing this work on their own properties, thus permitting more extensive Federal work. Acceptance by each individual of the responsibility for cleaning up and burning each year all cut and fallen elm wood and brush on his place before May 1 will likewise be a definite contribution. Furthermore, property owners may supplement this program by pruning dead and dying wood from elms that are yet of some value and should be retained. This type of clean-up work, carried out uniformly in the disease area, would materially reduce the amount of Dutch elm disease fungus and number of insect carriers in the area. Such sanitation work, if sponsored by civic organizations and garden clubs, could be profitably applied to an entire community.

CARE OF ELMs

In order to keep the amount of dead and dying elm wood at a minimum and to avoid the cost of annual sanitation work, elms should be kept in good condition. There are no data available to indicate definitely what effect the vitality of an elm has on the chances of its becoming infected or killed by the Dutch elm disease. There is, however, a direct relationship between the low vitality of elms and their infestation by the bark beetles which are known carriers of the disease. Careful spraying of elms to prevent damage by leaf-eating insects will make it possible to do more rapid and thorough scouting in the elm leaf beetle and cankerworm areas. It appears, therefore, that feeding, spraying, and other operations that tend to increase the vitality of elms may at least indirectly contribute to the Dutch elm disease eradication program.

¹ At the present time (March 1935) the address is: Field Headquarters, Dutch Elm Disease Eradication, Room 916, County Office Building, White Plains, N. Y.



